into air have been determined. The following examples have been taken from Landolt and Bernstein's tables:—

Gas or Vapour.	Coefficient of Diffusion into Air.	Molecular Weight.
Water vapour	0·198 ...	18
Carbonic acid gas	0·142 ...	44
Alcohol	0·101 ...	46
Ether	0·077 ...	74

In the above we see that the coefficients of diffusion follow the inverse order of the molecular weights. In cases of the simpler gases it has been shown experimentally that the coefficient of inter-diffusion is approximately inversely proportional to the square roots of the product of the molecular weights. If we apply these considerations to the emanations we see that it is a gas or a vapour of molecular weight (allowing a wide margin) probably lying between 40 and 100. These numbers exclude the possibility of the substance being a vapour of radium, for it has already been shown by M. and Mme. Curie that the atomic weight of radium is greater than that of barium.

We must, therefore, conclude that the emanation is in reality a heavy radio-active vapour or gas.

On account of the rapid decay of the radiating power of thorium emanations it is not possible to determine its coefficients of diffusion in the same way; but special experiments show that it diffuses rapidly, and is also probably gaseous in character. The physical properties of these emanations or gases are most remarkable. The radium emanation not only continues for long intervals to be a source of radiation which is apparently similar in character to easily absorbed Röntgen rays, but in some way manufactures from itself a positively charged substance, which travels to the negative electrode and becomes a source of secondary radio-activity.

Space is too short to enter into the interesting question of the possible explanation of these complicated phenomena.

McGill University, Montreal, May 30. E. RUTHERFORD.

Long-tailed Japanese Fowls.

A LITTLE while ago in your columns Prof. Lankester referred to this breed as "a magnificent sport," and considered the occurrence of genius in mankind as a case of the same kind. In Newton's "Dictionary of Birds," article "Feather," it is stated that in these Japanese poultry the moult is checked or prevented by some means unknown to Europeans. It is obvious that the latter statement, if correct, is not compatible with Prof. Lankester's description. If the breed really arose as "a magnificent sport," I presume that the excessive growth of the tail coverts would be due to a spontaneous variation, and not to some artificial method of preventing the annual moult. After a great deal of trouble I have succeeded in obtaining evidence, which seems to me unimpeachable, concerning the means taken by the Japanese to produce this extraordinary elongation of feather in the cocks of the breed in question.

I will quote the words of my informant. He writes:—"With regard to the treatment of these birds, in order to ensure very great length of tail, they ought after they are six months old to be kept on a perch as much as possible, and the tail feathers should be pulled gently every morning, grasping the centre bone-like part firmly with the finger and thumb, and, pressing steadily, draw downwards towards the tip, each feather being done several times; this softens the quill and causes it to lengthen. They do not moult the feathers, but if one or more come out others immediately grow in their place. The Japs themselves, those who take great pride in their birds, always roll the long feathers up, like a lady rolls up her hair, and tie them, whenever they are let off their perches to walk about, which is about twice a day for an hour at a time. . . .

"I have often seen them thus treated in Japan, and the man who brought mine over treated them in this way on the voyage over, and I sent them (to purchasers) in their regular perch cages."

I think this, being the evidence of direct observation, is enough to prove that the length of feather in these birds is not correctly described as a "sport," but has been produced by special artificial treatment. The effect of the treatment is doubtless to irritate the papilla from which the feather grows, and so cause increased growth, rather than to soften and lengthen the already formed quill. The feathers appear to grow throughout the year, so that when the moulting season is reached they are not shed, but continue growing.

There is no doubt that the peculiarity is to a certain extent hereditary, but extreme length of feather cannot, I believe, be produced without the special treatment. These fowls have been bred in England, and I have seen specimens which had tail coverts (and also hackles) longer than those of any European breed, but so far as I know no specimens bred in Europe have produced the extraordinary length of feather that is known to occur in Japanese specimens, for example in the two stuffed specimens in the hall of the Natural History Museum. It seems to me reasonable to conclude that the hereditary effect is due to the artificial irritation applied to a long succession of generations.

Penzance, June 5. J. T. CUNNINGHAM.

Variation in a Bee.

ON September 24, some years ago, I collected at Mesilla, New Mexico, four examples of a wild bee of the genus Epeolus, the species being probably identical with *Epeolus bardus* of Cresson. In every one of these specimens the second transverso-cubital nervure is incomplete, its lower half being wanting, on one or both sides. In one example only is the nervure incomplete on both sides; in the other three it is incomplete on the right side only. Such aberrations are not very uncommon among bees, but they usually occur in single examples, and this is the best instance known to me of their being inherited by a number of individuals. What is here clearly a sport seems in a fair way to become a racial character, and we seem to have a good example of Bateson's "discontinuous variation." In the genus Halictus certain species have only two submarginal cells, instead of the usual three, and the same is true of Andrena. These peculiar species are related to different groups of the genera to which they belong, so that if it is proposed to regard them as pertaining to distinct subgenera (or genera) by reason of their venation, it becomes necessary to propose several subgeneric names instead of one, because of the independent evolution of the species. That this evolution has resulted from the perpetuation of sports such as that described above we can hardly doubt, but we are not thereby compelled to admit that it may not also be beneficial to the species.

T. D. A. COCKERELL.

East Las Vegas, New Mexico, U.S.A., May 25.

Foreign Oysters Acquiring Characters of Natives.

THE facts contained in Mr. Tabor's letter, however interesting, supply no evidence for or against Lamarckism. When at Whitstable, the individual French oyster has certain characters impressed upon it by its environment. The next generation, when compared with the natives, show certain peculiarities, such as greater thickness of shell and greater growing power. But this also we are able to interpret as the reponse of the individual to the environment. If the peculiarities appear in many successive generations, the same explanation will account for the facts. If, however, Lamarckians could show that the effect of the environment, as the generations succeed one another, is cumulative, that the characters in question become *progressively* accentuated, then they would prove their case. But it does not appear that they have any such evidence at their command. F. W. HEADLEY.

Haileybury College, Hertford.

ITALIAN EXPLORATION IN ARCTIC REGIONS.

THE recent success of the Duke of the Abruzzi's expedition, which carried the Italian flag nearer the North Pole than ever flag flew before, has doubtless prepared a public in Italy for the literature of Polar exploration. The firm of Hoepli, who have conferred many favours on Italian-speaking geographers, have just published a history of Polar exploration in the nineteenth century by Signor Hugues.[1] The book makes no claim to originality, being merely a condensed popular description of the Polar voyages of the late century, and although more detailed on account of the shorter range of time dealt with, and coming down to the year 1900, it cannot compare with General Greely's compact handbook as a work of reference for the student. The most serious drawback is the want of a bibliography or a uniform

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[1] "Luigi Hugues—Le Esplorazioni Polari nel Secolo XIX." Pp. xx + 374. Maps and Illustrations. (Milano: Ulrici Hoepli, 1901). Price 12 lire.

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system of acknowledging sources of information. Another, which strikes an English reader, is the curiously unfamiliar aspect of well-known names of people and places in their Italian form—Giovanni Ross and Giuseppe Wiggins, Terra del Re Guglielmo and San Giovanni de Terranuova require some thinking over. Where so many personal names are foreign to the author, misprints may easily escape detection, and in the index a cursory inspection reveals about a dozen slips, of which the worst are Gordfelow for Goodfellow, and Newes for Newnes. Probably no English author could handle more than 600 foreign names with fewer accidents. Except for a tangle of dates on p. 98, and the necessary baldness in the treatment of some picturesque episodes induced by brevity, the narrative is clear, interesting and, so far as we can test it, correct. Most space is, of course, given to the Arctic regions; but the history of South Polar voyages is also summarised.

The members of the Italian Arctic expedition had a magnificent reception in Rome on January 14, the description of which, together with the addresses of the Duke of the Abruzzi and Captain Cagni, occupy practically the whole February number of the *Bollettino* of the Italian Geographical Society. The hall was splendidly decorated with flags and Arctic trophies; and the King and Queen of Italy, with other members of the Royal family, the great officers of State and the Diplomatic Corps, as well as the heads of the scientific bodies in Rome, were present.

The Duke of the Abruzzi described the equipment of the expedition and the voyage of the famous whaler *Jason*, renamed the *Stella Polare*, to her winter quarters in Teplitz Bay; and after Captain Cagni had told the story of his great sledge journey over the ice, H.R.H. resumed the narrative of his sojourn at the base and the return of the party to Europe.

The following is a brief summary of the facts:—

The *Stella Polare* left Archangel, where she had called for dogs, on July 12, 1899, and, after some delay in the ice, passed Cape Flora, in Franz Josef Land, on the 26th, sailed up the strait named by Jackson the British Channel and along the shore of the Queen Victoria Sea to a point in 82° 4′, just north of Cape Fligely on Prince Rudolf Island, which was reached on August 8th, after a good deal of trouble from the ice. Teplitz Bay, in 81° 47′, was chosen for wintering the ship; the dogs and stores were landed there, and the ship, having been damaged on September 9 by an ice-pressure, the party was obliged to land and live on shore. During the winter the Duke of the Abruzzi was severely frost-bitten in the hand and was obliged to abandon his intention of accompanying the sledge expedition to the north in spring. The command of this expedition accordingly devolved on Captain Cagni. The sledges used were of Nansen's pattern; the sleeping bags for the men were made of reindeer skin; pemmican was the chief food relied on, and petroleum was used for cooking. The expedition was marshalled in three divisions, each consisting of three men and four sledges, on which were placed 180 rations for men and 1150 for dogs. The provisions of the first division would suffice for the whole party for fifteen days after leaving the island, when the people of that division would return. The provisions of the second division would supply the two remaining groups for fifteen days more and then suffice to allow its members to return to the base, while the third group with their intact store of provisions should be able to push on for fifteen days more, or forty-five days from the base, before requiring to return.

In some preliminary sledge trips in February a temperature descending to −52° C. (−62° F.) was recorded, this being the lower limit of the graduation of the minimum thermometer. The start for the real attempt on the pole was made on March 11, 1900, when the caravan of three parties struck out boldly across the sea-ice, bound north, Captain Evenson and two sailors accompanying the expedition for two days with a thirteenth sledge. The advance at first was slow, on account of bad weather and rough ice. On March 22 the first division, consisting of Lieut. Quirini, the guide Ollier, and the engineer Stökken, left to return to Teplitz Bay. This party has never since been heard of, and there is little doubt that all three have perished. On March 31 the second group went back, and Captain Cagni continued on his way with three companions, Italian Alpine guides named Petigax, Fenouillet and Canepa. By sending back the other parties some days earlier than was at first intended he was able to retain a larger supply of provisions. Six sledges were taken on, and in spite of the difficulties of the way the party made excellent progress, and by reducing the rations they were able to continue the northward march to 86° 33′ 49″ in 64° 30′ E., which was attained on April 25. The journey at times was comparatively easy, the ice in places being smooth and covered with firm snow, but frequent pressure-ridges had to be surmounted and proved serious obstacles. In the latter part of the journey, when the temperature did not descend below zero Fahrenheit, lanes of water often opened with dangerous suddenness and caused great delay, while frequent gales and bad weather of every kind were encountered. The return journey, with rapidly dwindling provisions and diminished strength, was extremely laborious and the steady drift of the ice to the westward was a very serious difficulty, and, despite an increasing easterly component in the direction of march, the first land sighted was Harley and Neale Islands and Cape Mill, fifty miles west by south of Teplitz Bay. It was June 22 before the base was reached, and Captain Cagni had been absent 104 days, making (apart from the loss of the three men in the missing party) perhaps the most successful sledge journey ever accomplished in the Arctic regions, and certainly reaching the highest latitude.

The *Stella Polare*, after temporary repairs, was released from the ice with great difficulty, and only succeeded in getting away from Teplitz Bay on August 15, after which a good passage was made to Norway.

The results of the expedition are touched on slightly. Petermann Land and King Oscar Land, reported by Payer, have been shown not to exist in sight of the positions assigned to them. Cape Fligely (81° 51′) is proved to be the most northerly point of Franz Josef Land, and Cape Sherard Osborn does not belong to the same island, if it has any real existence. Doubt is thrown on the existence of the islands reported by Wellman north of Hvidtenland; but the maps of the Jackson expedition appear to have been found accurate so far as they could be tested. A year's meteorological and magnetic observations were obtained at Teplitz Bay, and gravity and tidal observations were also carried out. Prince Rudolf Island was found to consist entirely of basaltic rock. Animal life was not found very abundant, polar bears being the only common land mammals, and no new birds appear to have been discovered.

HAILSTORM ARTILLERY.

In the absence of any recognised English equivalent for the expressive German term *Das Wetterschiessen*, I have thought it best in the heading of this article to avoid a literal translation of it lest it should give rise to misunderstanding. "Weather shooting" does not refer to any haphazard or empirical attempts to foretell the weather, but to a practice which has lately come to have great vogue in Styria, Italy and elsewhere of firing off charges of gunpowder to protect the vineyards against injury from hail. So popular indeed has the practice become in some districts that there is danger of the

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